Geophysical Research Abstracts,
Vol. 11, EGU2009-12402, 2009
EGU General Assembly 2009

On the influence of temporal change on the validity of landslide susceptibility maps in an alpine catchment, Switzerland

K. Meusburger and C. Alewell
University of Basel, Institute of Environmental Geosciences, Basel, Switzerland (katrin.meusburger@unibas.ch)

Global change (as a combination of climate and land use change) poses a risk to stability of alpine soils, and may enhance landslide hazard. The occurrence of landslides depends on static catchment characteristics (e.g. geology, topography etc.), as well as triggering factors that are variable in time (dynamic factors), such as event characteristics and land use. However, in literature the effects of temporal change are still discussed controversially and most statistical landslide prediction models rely on static catchment characteristics alone. In this study, we aim to assess the additional influence of dynamic factors on landslide susceptibility and on the validity of commonly used statistical landslide models. The Urseren Valley (Central Swiss Alps) was chosen as study area due to the evidence of climate and land use change. To assess the influence of catchment characteristics on landslide susceptibility, we set up a logistic regression model using 20 static predictor variables. The additional impact of dynamic risk factors was evaluated with historic data (aerial photographs and meteorological time series). We found that geology, slope and stream density were the most significant static predictors and could explain 70% of the landslide variation. However, the area affected by landslides increased by 92% from 1959 to 2004, which highlights the crucial role of dynamic landslide triggering factors. Furthermore, more recent landslides (since 2000) could only in part be predicted, which confirmed our proposed hypothesis that the validity of statistical hazard models may worsen over time. Discrepancies between predicted susceptibility and observed landslides mainly occurred in areas that have undergone land use changes. Consequently, slopes, that have formerly been classified as only “medium” landslide susceptibility may nonetheless have a high probability to fail under changed management. Spatial information of the impact of land use on landslide susceptibility could be extracted from multi-temporal data, and explain 85% of the new observed landslides since 2000.